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(73) Proprietor: **Tetra Laval Holdings & Finance SA**
Avenue Général-Guisan 70
CH-1009 Pully (CH)

(72) Inventor: **Holmström, Gert**
Musikantvägen 8 B
S-223 68 Lund (SE)
Inventor: **Pozna, Lazlo**
c/o Judit Pozna,
Lantmannagatan 11 B
S-214 44 Malmö (SE)

(74) Representative: **Müller, Hans-Jürgen, Dipl.-Ing. et al**
Patentanwälte Dipl.-Ing. Hans-Jürgen Müller,
Dipl.-Chem.Dr. Gerhard Schupfner,
Dipl.-Ing. Hans-Peter Gauger,
Postfach
101161
D-80085 München (DE)

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Description

The invention refers to an apparatus for sealing thermoplastic-coated packaging material of the type mentioned in the first part of claim 1.

An apparatus of this type is described in DE-A-2 835 552. The two electrical conductors extend in a plane situated parallel to the plane of the packaging material to be sealed by heating and melting the thermoplastic coating. Both electrical conductors comprise similar cross-sections and extensions creating a pair of symetrically arranged sealing zones.

This type of induction welding comprises advantages over sealing by using hot air. However, relatively high losses of energy are created.

It is an object of the present invention to find a sealing apparatus of a relatively simple design allowing good sealing within a relatively narrow surface without high current losses and avoiding cooling problems with regard to the inductor.

The invention is characterized in claim 1 and in sub-claims preferred embodiments are claimed.

According to the present invention at least one of the two conductors is of substantially greater extend than the second conductor thereby forming an asymetrical configuration. The conductor of substantially greater extension extends in a second plane situated at about a right angle to the plane in which the sealing of the thermoplastic materials take place. However, this angle needs not to be an exact right angle.

A preferred embodiment of the present invention will now be described in greater detail below with regard to the drawings.

Figure 1 shows the inductor portion of the apparatus;

Figure 2 schematically illustrates a section through the inductor portion of the apparatus and

Fig. 3 schematically illustrates a section displaying how the sealing is carried out on the edge of the pre-cut blank.

DESCRIPTION OF PREFERRED EMBODIMENT

Referring to the Drawings, Fig. 1 shows the inductor portion of the apparatus, this portion consisting of a substantially parallelepipedic carrier portion 2 manufactured from an electrically insulating substance, preferably a cast compound with ferrite.

In, and partly on the surface of the carrier portion, there are two conductors 3 and 4 which are electrically interconnected. The one conductor 3 consists of a tube or rod of copper. The other conductor 4 consists of a copper plate. The first-mentioned conductor 3 may advantageously be designed with a ridge 5 upstanding from the carrier portion surface. This upstanding ridge 5 is, during the sealing operation, compressed with harder pressure against the packaging material 9 and contributes in the realisation of better sealing seams or joints.

In one plane of the carrier portion 2, designated the first plane 6, the two conductors 3, 4 are seen on the surface as two parts of approximately equal width, with a space between them. In a second plane 7 at right angles to the first plane 6, the one conductor 4 is seen as a considerably wider copper surface. Its width is at least twice that of the width of the conductor 3. In one preferred embodiment, the conductor 4 is roughly three times wider than the width of the conductor 3. The heating ratio is the square of the width and, in the preferred embodiment, there will thus be obtained a ninefold higher heating under the narrower conductor 4, at the same time as the size of the inductor 1 can be kept within acceptable limits.

In the one end of the carrier portion, the conductors 3 and 4 are extended to connection members 8 for a high frequency current source (not shown) from which a constant power output can be obtained which can be regulated for an optimum welding process. In the other end of the carrier portion 2, the conductors 3 and 4 are electrically interconnected so that they constitute one turn in a coil.

A sealing apparatus or inductor 1 of the type illustrated in Fig. 1 is intended to be mounted in a machine part which is caused to execute the desired sealing movement and apply the desired sealing pressure. In other words, this sealing portion (which is often called a sealing jaw) is moved in a relative movement towards a so-called counter jaw 10 which, in most cases, is also movable. The counter jaw 10 is wholly or partly manufactured from hard rubber in order to be able to serve as a pressure equalizer. The open end of the filled package container blank is formed so that the packaging material 9 is brought together over as great a width as possible. The above-mentioned sealing jaws 1 and 10 are closed towards one another as shown in Fig. 3, and both of the sealing jaws 1 and 10 surround that part of the packaging material 9 which is to be sealed. In such instance, the packaging material 9 abuts against both of the planes 6 and 7 where the conductors 3 and 4 are visible on the surface of the carrier portion 2 of the inductor 1.

The sealing jaws 1 and 10 exercise a pressure on the compressed packaging material layers 9 at the same time as heat is generated in the sealing region with the aid of the inductor 1.

When a high frequency current passes through that coil constituted by both of the conductors 3

and 4 of the inductor 1, a current is induced in the metal foil layer in the packaging material 9, with the result that the metal foil layer is rapidly heated and gives off heat to the adjacent thermoplastic layer which is caused to melt and fuse with adjacent inner thermoplastic layers of the adjacent packaging material layer. This heating is realised rapidly and efficiently and it may in principle be assumed that the metal foil layer constitutes a short-circuited winding in a transformer, in which the inductor coil constitutes the primary winding.

If the inductor 1 is placed adjacent the aluminium foil layer in which a current is to be induced, the current flow path in the aluminium layer will be most distinctly central in the conductor 3 and the heat generation will be limited to a narrow region 11 which substantially corresponds to the width of the induction conductor 3. Facing the wide portion of the conductor 4 in the second plane 7, the induced current is distributed over a region 12 which is at least three times wider than the region 11 located centrally of the conductor 3. Since the current is distributed over a greater surface area in the conductor 4, the region 12 will not be heated to the melting point of the thermoplastic and the packaging material 9 which abuts against the wide portion of the conductor 4 will remain unaffected at the moment of fusion and sealing. If the conductor 4 is placed as in the preferred embodiment, there will be obtained a concentrated and efficient seal of the packaging material 9. In any other placing, in which the conductor 4 is disposed further away from the packaging material 9, there is the risk of a deterioration in the sealing effect, in particular towards the ends of the inductor 1.

Thus, employing the present invention, it is possible to realise a sealing or fusion caused by induction heating of a very limited width in which the margins are small and in which it is not permitted to overstep beyond that region which is available for the seal proper. At the same time, the inductor is employed in an efficient manner and a tight and durable sealing seam or joint will be obtained.

Claims

1. Apparatus for sealing thermoplastic-coated packaging material (9) comprising at least one layer of metal foil, preferably aluminium foil, said apparatus including an inductor (1) connectable to a high frequency current being relatively movable with respect to a source, and a counter block (10) and comprising at least two conductors (3, 4) disposed in parallel in a first plane (6) in slight spaced apart relationship from one another, and an electrically insulating carrier portion (2) wherein the packaging material (9) is disposed for sealing purposes between said inductor (1) and said counter block (10) in said first plane (6),
characterized in that
at least one (4) of the two conductors (3, 4) is of substantially greater extent than the second conductor (3) in a second plane (7) situated at about a right angle to said first plane (6).

2. Apparatus as claimed in claim 1,
characterized in that
said first conductor (4) is of a width in said plane (7) of at least twice as wide as the second conductor (3).

3. Apparatus as claimed in claim 1 or 2,
characterized in that
both of the conductors (3, 4) are of the same width in said first plane (6).

4. Apparatus as claimed in one of the preceding claims,
characterized in that
said packaging material (9) at least partially abuts against said substantially greater extended portion of said one conductor (4) lying in said second plane (7).

Patentansprüche

1. Vorrichtung zum Schweißen von thermoplastbeschichtetem Packstoff (9), der wenigstens eine Lage Metallfolie, bevorzugt Aluminiumfolie, aufweist, wobei die Vorrichtung einen Induktor (1), der mit einem HF-Strom verbindbar und in bezug auf eine Stromquelle relativ bewegbar ist, und einen Gegenblock (10) aufweist und wenigstens zwei Leiter (3, 4), die in einer ersten Ebene (6) in geringfügig voneinander beabstandeter Beziehung parallel zueinander angeordnet sind, und eine elektrisch isolierende Trägereinheit (2) aufweist, wobei der Packstoff (9) zum Zweck des Schweißens zwischen dem Induktor (1) und dem Gegenblock (10) in der ersten Ebene (6) angeordnet wird,
dadurch gekennzeichnet,
daß wenigstens einer (4) der beiden Leiter (3, 4) eine erheblich größere Ausdehnung als der zweite Leiter (3) in einer zweiten Ebene (7) hat, die ungefähr unter einem rechten Winkel zu der ersten Ebene (6) liegt.

2. Vorrichtung nach Anspruch 1,
dadurch gekennzeichnet,
daß der erste Leiter (4) eine Breite in der genannten Ebene (7) hat, die wenigstens doppelt so breit wie der zweite Leiter (3) ist.

3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet,** daß beide Leiter (3, 4) in der ersten Ebene (6) die gleiche Breite haben.

4. Vorrichtung nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,** daß der Packstoff (9) wenigstens teilweise an dem wesentlich größeren ausgedehnten Bereich des einen Leiters (4) anliegt, der in der zweiten Ebene (7) liegt.

Revendications

1. Dispositif pour le soudage d'une matière d'emballage à revêtement thermoplastique (9) comprenant au moins une couche de feuille métallique mince, de préférence en aluminium, ledit dispositif comprenant un inducteur (1), connectable à un courant haute fréquence et déplaçable par rapport à une source, et un contre-bloc (10), et comportant au moins deux conducteurs (3,4) disposés en parallèle dans un premier plan (6) à faible distance l'un de l'autre, et un élément porteur électriquement isolant (2), dans lequel la matière d'emballage (9) est placée pour soudage entre ledit inducteur (1) et ledit contre-bloc (10) dans ledit premier plan (6), caractérisé en ce qu'au moins un (4) des deux conducteurs (3,4) est de dimension sensiblement plus grande que le deuxième conducteur (3), dans un deuxième plan (7) sensiblement perpendiculaire audit premier plan (6).

2. Dispositif suivant la revendication 1, caractérisé en ce que ledit premier conducteur (4) a une largeur, dans ledit plan (7), qui est au moins le double de la largeur du deuxième conducteur (3).

3. Dispositif suivant la revendication 1 ou 2, caractérisé en ce que les deux conducteurs (3,4) ont la même largeur dans ledit premier plan (6).

4. Dispositif suivant une quelconque des revendications précédentes, caractérisé en ce que ladite matière d'emballage (9) bute au moins partiellement contre ladite partie sensiblement plus étendue dudit premier conducteur (4) située dans ledit deuxième plan (7).

Fig.1

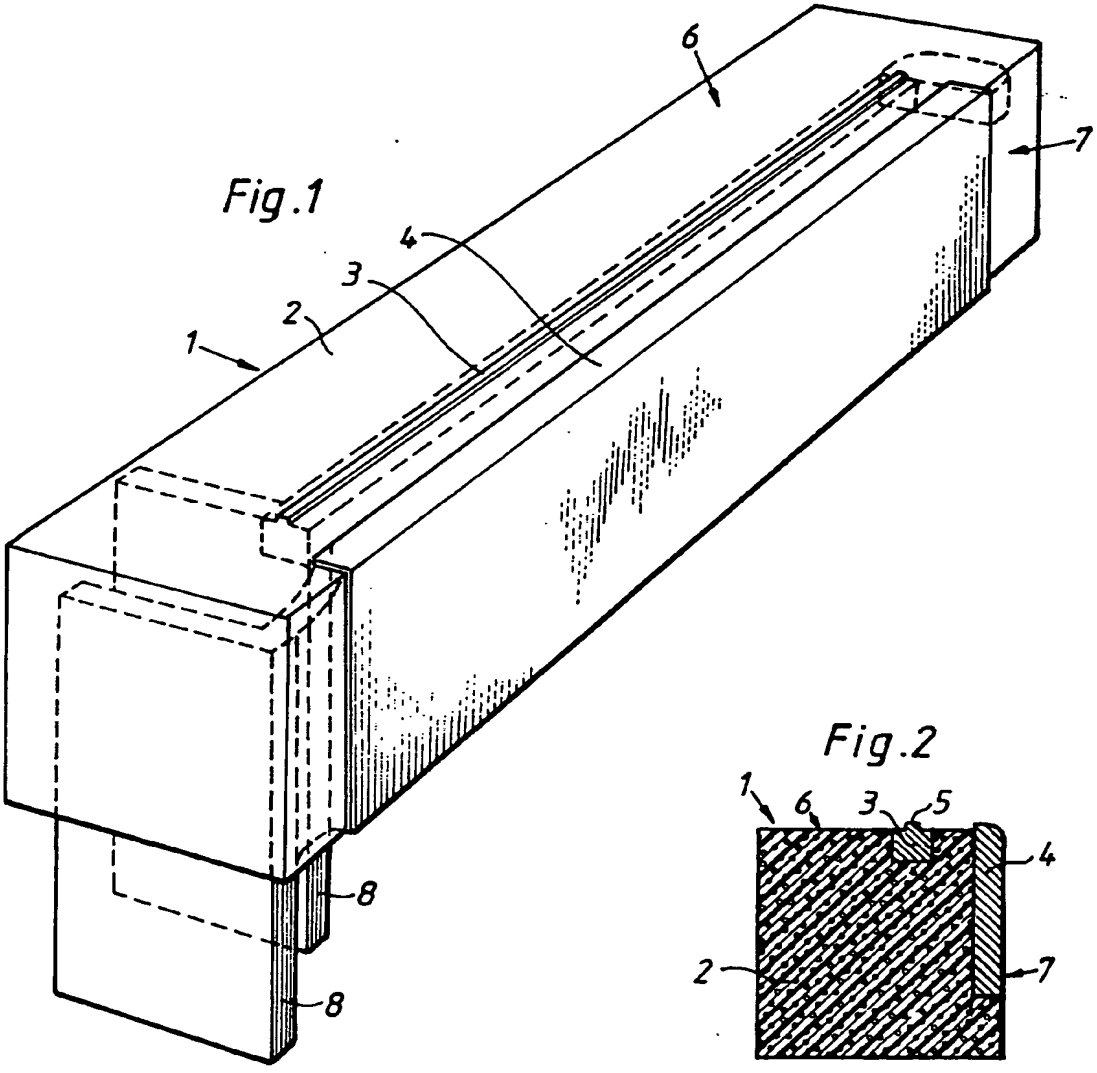

Fig.2

Fig.3